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Dr. A. A. COMMON, LL.D., F.R.S., President, in the Chair.

George Denton Hirst, Sydney, New South Wales, Australia ;
 Samuel V. Hoffman, 1 Chelsea Square, New York City, U.S.A. ;
 Henry T. C. Knox, F.R.G.S., Lieut. (late R.N.), 17 Upper
 Montague Street, W. ;
 E. F. J. Love, M.A., The University, Melbourne, Victoria,
 Australia ; and
 The Rev. Daniel Higham Sparling, B.A., Rector of Biddulph
 Moor, Congleton,

were balloted for and duly elected Fellows of the Society.

The following candidates were proposed for election as Fellows of the Society, the names of the proposers from personal knowledge being appended :

Andrew Russell Forsyth, LL.D., F.R.S., Sadlerian Professor of
 Pure Mathematics, Cambridge (proposed by H. H. Turner) ;
 John Willoughby Meares, Electrical Engineer, Clive Hall,
 Shrewsbury (proposed by Arthur Mee) ; and
 William Willett, Junr., The Cedars, Chiselhurst Common, Kent,
 and 2 Sloane Gardens, S.W. (proposed by W. H. Thornthwaite).

One hundred and two presents were announced as having been received since the last meeting, including, amongst others :—

The Elements of the four inner planets and the fundamental Constants of Astronomy, by Simon Newcomb, presented by the

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American Nautical Almanac Office ; Annals of Harvard College Observatory, vol. xxxii., Part I. (Investigations in Astronomical Photography, by W. H. Pickering), presented by the Observatory ; a sixteenth century celestial globe, on bronze tripod stand, presented by the Earl of Crawford ; three large transparencies of portions of the Moon, from negatives made with the equatorial coudé of the Paris Observatory, presented by MM. Lœwy and Puiseux.

On the Rotation and Mechanical State of the Sun.

By R. A. Sampson, M.A.

(Abstract.)*

The author's aim is to consider with the simplest sufficient hypotheses the mathematical theory of the mechanical state and the relative motions of the parts of the Sun.

Starting from the equations of equilibrium of a gas, it appears that equilibrium is a state which will only exist either (1) when the temperature is maintained a function of the density, or (2) when all quantities are geometrically functions of only one parameter.

In the former case it is shown under what condition a body of gas will cohere in finite volume, and that if this condition is unfulfilled the density can nowhere be finite unless the total mass be infinite.

The study of the second case begins with the law of distribution of temperature. Conduction is assumed to be inoperative until instability producing convection currents is proved to exist, so that the agent of distribution must be taken to be radiation. The author shows that if three hypotheses be made—

(1) Each isolated small body of gas radiates heat at a rate proportional to its mass and to its absolute temperature conjointly.

(2) Each small body of gas absorbs heat proportionally to its mass, and to the quantity of heat that penetrates it, conjointly.

(3) The entire radiations from any element of a sheet of matter pursue the same course (normal to the wave fronts) without interference ; then the temperature (θ) satisfies a partial differential equation, which yields the set of solutions—

$$\theta_n = \alpha_n \exp\left(-\frac{2\varpi\mu_n^2}{\mu_n^2 + \varpi'^2} \frac{t}{c}\right) \cos \mu_n m,$$

where μ_n is one of the roots of

$$\mu \tan \mu M = \varpi',$$

α is arbitrary, c , ϖ , ϖ' are certain constants, M is the total mass, and m is the mass within a certain surface passing through the

* For the complete paper, vide *Memoirs*, vol. li.